

REMARKS

By this response, Claim 33 has been amended, and new Claims 34-36 have been added, leaving Claims 8, 10-18 and 24-36 pending in the application.

Reconsideration and allowance are respectfully requested in light of the following remarks.

Personal Interview

Applicants thank Examiner Tran for the courtesies extended to the undersigned during the personal interview on May 17, 2005. A separate record of the substance of the interview is incorporated in the following remarks.

Allowable Subject Matter

Applicants gratefully acknowledge the indication in the Official Action that Claims 25 and 29 have been allowed.

First Rejection Under 35 U.S.C. § 103

Claims 8, 10, 13-18, 24, 26, 30 and 33 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,606,485 to Shamouilian et al. ("Shamouilian '485") in view of U.S. Patent No. 6,120,854 to Clarke et al. ("Clarke"). The reasons for the rejection are stated at pages 3-4 of the Official Action. The rejection is respectfully traversed.

Claim 8 recites "a component of semiconductor processing equipment, the component comprising a substrate having a surface and a liquid crystalline polymer coating on the surface of the substrate and forming an outer surface of the

component, the outer surface being resistant to plasma erosion and corrosion in the semiconductor processing equipment, wherein the component is a component other than a chamber liner” (emphasis added). As recited in Claim 8, the component comprises a liquid crystalline polymer coating forming an outer surface of the component and which is resistant to plasma erosion and corrosion in semiconductor processing equipment. It is respectfully submitted that the applied references fail to suggest the claimed component for the following reasons.

Shamouilian '485 discloses an electrostatic chuck 20 including a substrate 28 and an insulator 22, in which an electrode 24 is embedded, on the substrate 28. The insulator 22 forms the outer surface of the electrostatic chuck 20. The insulator 22 can be a ceramic material or a polymer, and typically comprises a polymer. See the paragraph bridging columns 4 to 5 of Shamouilian '485. It is acknowledged in the Official Action that Shamouilian '485 does not disclose or suggest a “liquid crystalline polymer coating on the surface of the substrate and forming an outer surface of the component,” as recited in Claim 8.

However, Shamouilian '485 not only fails to disclose or suggest the claimed liquid crystalline polymer coating, which is effective to protect the component from plasma erosion and corrosion in semiconductor processing equipment, but includes disclosure that would have led one having ordinary skill in the art away from the claimed liquid crystalline polymer coating. Particularly, Shamouilian '485 discloses that a protective coating can be applied on the upper surface of the insulator 22 for the purpose of protecting the insulator 22 from corrosive and erosive processing environments. See column 5, lines 51-55. Shamouilian '485 references U.S. Application No. 08/052,018 as describing “preferred protective coatings and

processes for their fabrication.” Applicants note that the ‘018 application was abandoned, but a continuation of the ‘018 application issued as U.S. Patent No. 5,560,780 to Wu et al. Wu discloses forming a protective coating on polymeric dielectric materials provided on a wafer support in a semiconductor wafer processing apparatus to electrostatically clamp a wafer to the support. According to Wu, for an aluminum wafer support (which the Official Action contends Shamouilian ‘485 also discloses), the protective coating is of an inorganic aluminum compound. See column 4, lines 16-20, of Wu. Thus, also according to Shamouilian ‘485, an inorganic aluminum compound should be used as the protective coating to protect the insulator 22 from corrosive and erosive processing environments. Shamouilian ‘485 thus does not suggest that a liquid crystalline polymer coating can be applied as the protective coating on the insulator 22, or that the insulator 22 can be of a liquid crystalline polymer.

According to MPEP 2141.02, page 2100-127, “[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would have led away from the claimed invention” (citation omitted). Applicants submit that Shamouilian ‘485, when properly considered in its entirety, would have led one having ordinary skill in the art away from modifying the electrostatic chuck 20 in a manner necessary to result in the component recited in Claim 8.

Despite the deficiencies of Shamouilian ‘485 with respect to the claimed component, the Official Action asserts that Clarke discloses use of a liquid crystalline polymer coating and that it would have been obvious to modify the Shamouilian ‘485 electrostatic chuck 20 by using liquid crystalline polymer “because it is capable of

withstanding high temperature due to significant melt strength property." Applicants respectfully disagree with these assertions.

Clarke discloses plasma spraying of particulate thermotropic liquid crystalline polymers onto surfaces of composite and metallic structures, such as a ship or on a military or commercial aircraft (column 1, lines 54-63). For the reasons stated in the response filed on January 24, 2005, Applicants submit that Clarke is non-analogous prior art with respect to the claimed subject matter. Particularly, Clarke is not a) directed to the field of semiconductor processing equipment or b) reasonably pertinent to the problem to which the claimed component is directed to; i.e., to providing a plasma erosion resistant and corrosion resistant surface on components of plasma processing equipment. The claimed outer surface of a liquid crystalline polymer can reduce particle and metallic contamination of semiconductor wafers processed in the equipment. Accordingly, because Clarke is non-analogous prior art with respect to the claimed subject matter, the rejection should be withdrawn.

Moreover, the Official Action has failed to establish the required motivation to modify the Shamouilian '485 electrostatic chuck 20 in a manner necessary to result in the component recited in Claim 8. As discussed above, Shamouilian '485 discloses that an inorganic aluminum compound can be applied over the insulator 22 to protect the insulator from corrosive and erosive processing environments. As such, the applied combination of Shamouilian '485 and Clarke does not suggest modifying the electrostatic chuck 20 by applying a protective outer coating of a liquid crystalline polymer.

Clarke does not disclose or suggest that the liquid crystal polymer would be suitable for use as a protective coating in a plasma environment of semiconductor

processing equipment, much less that the coating can reduce particle and metallic contamination of semiconductor wafers processed in the equipment.. Also, according to Wu, the protective coating needs to have specific electrical properties to allow its use in an electrostatic chuck. See column 4, lines 7-15. Clarke does not disclose any electrical properties of the liquid crystal polymer material, much less disclose that it would have the needed electrical properties disclosed by Wu.

Clarke also does not suggest forming the Shamoulian '485 insulator 22 of the liquid crystalline polymer. Clarke discloses that the liquid crystalline polymer is applied as a protective coating on ships and aircraft and clearly does not suggest that it could be used to make an insulator region of an electrostatic chuck for semiconductor processing.

However, it is well-established that the prior art itself, and not Applicants' disclosure, must provide a reasonable expectation of success. See, e.g., In re Vaeck, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991). The Official Action has not established that one skilled in the art would have a reasonable expectation of success of using Clarke's coating in a plasma environment. Accordingly, the Official Action provides an inadequate basis for establishing the requisite motivation for combining Shamoulian '485 and Clarke. Accordingly, the rejection is also improper for this additional reason.

As further evidence in support of the unobviousness of the claimed subject matter, Applicants have attached a copy of a decision issued by the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences in U.S. Application No. 09/749,923. In the decision, the Board found that claims directed to a component of semiconductor processing equipment that included a fullerene containing coating on

the component and forming an outer corrosion resistant surface were not rendered obvious by a combination of references, where neither reference disclosed or suggested that a fullerene containing material could be applied to surfaces of components used in semiconductor processing equipment, much less that such material is resistant to plasma in a plasma reactor. According to the Board, the references did not provide the required motivation to combine the reference teachings to result in the claimed component of semiconductor processing equipment. Applicants respectfully submit that the facts regarding this ground of rejection are analogous to those considered by the Board. Thus, it is respectfully submitted that the Examiner should also find that the applied references do not provide the necessary motivation to modify Shamouilian '485 in a manner to result in the claimed subject matter, at least because neither reference discloses or suggests that a liquid crystalline polymer could be applied to surfaces of components used in semiconductor processing equipment, much less that such material is resistant to plasma in a plasma reactor.

For at least the foregoing reasons, Applicants respectfully submit that the component recited in Claim 8 is patentable. Dependent Claims 10, 14, 15, 17, 18, 26 and 33 are also patentable for at least the same reasons as those discussed with respect to Claim 8. Moreover, these dependent claims recite additional combinations of features that further patentably distinguish the claimed component over the applied references. For example, Claim 33, as amended, recites that "the component is other than an electrostatic chuck." In contrast, Shamouilian '485 only discloses an electrostatic chuck.

Independent Claim 13 recites "a component of semiconductor processing equipment, the component comprising a substrate including a surface and a plasma-sprayed liquid crystalline polymer coating on the surface of the substrate and forming an outer surface of the component, the outer surface being resistant to plasma erosion and corrosion in the semiconductor processing equipment" (emphasis added). Applicants respectfully submit that the component recited in Claim 13 is also patentable over the applied references for reasons discussed above.

Dependent Claims 16, 24 and 30 are also patentable for at least the same reasons as those for which Claim 13 is patentable.

Therefore, withdrawal of the rejection is respectfully requested.

Second Rejection Under 35 U.S.C. § 103

Claims 11, 27, 28, 31 and 32 stand rejected under 35 U.S.C. § 103(a) over Shamouilian '485 in view of Clarke, and further in view of U.S. Patent Application Publication No. 2002/0036881 to Shamoulian et al. ("Shamoulian '881"). The reasons for the rejection are stated at numbered points (5a) and (5b) at pages 4-5 of the Official Action. The rejection is respectfully traversed.

The Official Action acknowledges that Shamouilian '485 and Clarke fail to disclose or suggest the substrate materials recited in Claims 11, 27, 28, 31 and 32. However, the Official Action asserts that Shamoulian '881 cures the deficiencies of Shamouilian '485 and Clarke with respect to the subject matter recited in these dependent claims.

Applicants respectfully submit that Shamouilian '881 also fails to disclose or suggest modifying the Shamouilian '485 electrostatic chuck 20 to include the

combination of features recited in Claims 8 and 13, including a protective liquid crystalline polymer coating. Thus, the subject matter recited in Claims 11, 27, 28, 31 and 32 would not have been rendered obvious by the applied combination of references.

Therefore, withdrawal of the rejection is respectfully requested.

Third Rejection Under 35 U.S.C. § 103

Claim 12 stands rejected under 35 U.S.C. § 103(a) over Shamouilian '485 in view of Clarke, and further in view of U.S. Patent No. 4,736,087 to Whitlock et al. ("Whitlock"). The reasons for the rejection are stated at pages 5-6 of the Official Action. The rejection is respectfully traversed.

The Official Action acknowledges that Shamouilian '485 and Clarke fail to disclose or suggest a substrate including an anodized surface as recited in Claim 12. However, the Official Action asserts that Whitlock cures the deficiencies of Shamouilian '485 and Clarke with respect to the subject matter recited in Claim 12.

Applicants respectfully submit that Whitlock also fails to disclose or suggest modifying the Shamouilian '485 electrostatic chuck 20 to include the combination of features recited in Claim 12, including a liquid crystalline polymer coating. Thus, the subject matter of Claim 12 would not have been rendered obvious by the applied combination of references.

Therefore, withdrawal of the rejection is respectfully requested.

New Claims

New Claim 34 depends from Claim 8 and recites the features of the component "consists essentially of the substrate and the plasma-sprayed liquid crystalline polymer coating on the surface of the substrate and forming the outer surface of the component" (emphasis added). In contrast, the Shamouilian '485 electrostatic chuck 20 includes various other elements, such as the electrode 24 embedded in the insulator 22. The component recited in Claim 34 is patentable over Shamouilian '485.

New Claim 35 depends from Claim 13 and recites that "the component is other than an electrostatic chuck." Claim 35 is also patentable for reasons stated above.

New Claim 36 depends from Claim 13 and recites features similar to those of Claim 34. Claim 36 is also patentable over Shamouilian '485.

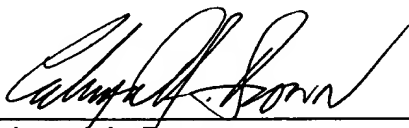
Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. Should the Examiner wish to discuss this response, Applicants' undersigned representative can be reached at the telephone number below.

Respectfully submitted,

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